# Infant Feeding Options in the Context of HIV

LINKAGES

# Infant Feeding Options in the Context of HIV

April 2004

*Infant Feeding Options in the Context of HIV* is a publication by LINKAGES: Breastfeeding, LAM, Related Complementary Feeding, and Maternal Nutrition Program, and was made possible through support provided to the Academy for Educational Development (AED) by the Bureau for Global Health of the United States Agency for International Development (USAID), under the terms of Cooperative Agreement No. HRN-A-00-97-00007-00. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of USAID or AED.

**The LINKAGES Project**
Academy for Educational Development
1825 Connecticut Avenue NW
Washington, DC 20009
Tel: 202-884-8000
Fax: 202-884-8977
E-mail: linkages@aed.org
Website: linkagesproject.org

April 2004

# Table of Contents

## Acknowledgments

This document was developed by LINKAGES' PMTCT Technical Working Group, with special recognition to Maryanne Stone Jiménez, Luann Martin, and Jay Ross. Valuable input was provided by Peggy L. Henderson, Scientist, Department of Child and Adolescent Health, WHO-Geneva; Judiann McNulty, Chair of the Nutrition Working Group of the Child Survival Collaborations and Resources Group; Ellen Piwoz, Nutrition Advisor, SARA Project, Academy for Educational Development; and Felicity Savage, Honorary Senior Lecturer, Institute of Child Health-London.

# Glossary

**AFASS:** acceptable, feasible, affordable, sustainable, and safe (terms referring to the conditions that should be in place for replacement feeding)

**AIDS:** acquired human immunodeficiency syndrome (the active pathological condition that follows the earlier, non-symptomatic state of being HIV positive)

**Artificial feeding:** feeding with breastmilk substitutes

**ARV:** antiretroviral drug for HIV prophylaxis or treatment

**Bottle feeding:** feeding from a bottle, whatever its content, which may be expressed breastmilk, water, infant formula, or another food or liquid

**Breastmilk substitute:** any food being marketed or otherwise represented as a partial or total replacement for breastmilk, whether or not suitable for that purpose

**Cessation of breastfeeding:** completely stopping breastfeeding, including suckling

**Commercial infant formula:** a breastmilk substitute formulated industrially in accordance with applicable Codex Alimentarius standards to satisfy the nutritional requirements of infants during the first months of life up to the introduction of complementary foods

**Complementary feeding:** the child receives both breastmilk or a breastmilk substitute and solid (or semi-solid) food

**Complementary food:** any food, whether manufactured or locally prepared, used as a complement to breastmilk or to a breastmilk substitute

**Cup feeding:** being fed from or drinking from an open cup, irrespective of its content

**Exclusive breastfeeding:** an infant receives only breastmilk and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements, or medicines

**Human immunodeficiency virus (HIV):** the virus that causes AIDS. In this document, the term HIV means HIV-1. Mother-to-child transmission of HIV-2 is rare.

**HIV-infected:** refers to people who are infected with HIV, whether or not they are aware of it

**HIV-negative:** refers to people who have taken an HIV test and who know that they tested negative, or to young children who have tested negative and whose parents or guardians know the result

**HIV-positive:** refers to people who have taken an HIV test and who know that they tested positive, or to young children who have tested positive and whose parents or guardians know the result

**HIV status unknown:** refers to people who either have not taken an HIV test or do not know the result of a test they have taken

**HIV testing and counseling:** testing for HIV status, preceded and followed by counseling. Testing should be voluntary and confidential, with fully informed consent. The expression encompasses the following terms: counseling and voluntary testing, voluntary counseling and testing, and voluntary and confidential counseling and testing. Counseling is a process, not a one-off event: for the HIV-positive client it should include life planning, and, if the client is pregnant or has recently given birth, it should include infant feeding considerations.

**Home-modified animal milk:** a breastmilk substitute prepared at home from fresh or processed animal milks, suitably diluted with water and with the addition of sugar and micronutrients

**Infant:** a person from birth to 12 months of age

**Mixed feeding:** feeding both breastmilk and other foods or liquids

**Mother-to-child transmission (MTCT):** transmission of HIV to a child from an HIV-infected woman during pregnancy, delivery, or breastfeeding

**Replacement feeding:** feeding infants who are receiving no breastmilk with a diet that provides the nutrients infants need until the age at which they can be fully fed on family foods. During the first 6 months of life, replacement feeding should be with a suitable breastmilk substitute. After 6 months the suitable breastmilk substitute should be complemented with other foods.

**Transition:** A period and process to accustom the infant and mother to new feeding patterns, after which all breastmilk is replaced with breastmilk substitutes

**UHT milk:** ultra-heat-treated milk that has been sterilized and can be kept unopened without refrigeration

**Viral load:** the amount of HIV in the blood of an HIV-positive person

# Introduction

Aware of the risk of HIV transmission through breastfeeding, policy makers, program managers, and health care providers are struggling to develop appropriate guidance on infant feeding for HIV-positive women. Uncertainty about factors that influence HIV transmission rates and the risks associated with different feeding alternatives hampers the formulation of evidence-based programs and policies. The recommendations put forward in this document are intended to address these uncertainties. They are based on scientific evidence, current research findings, and program experience. Their objective is to prevent mother-to-child transmission (MTCT) of HIV and maximize HIV-free survival, while continuing to protect, promote, and support breastfeeding for women who do not know their HIV status or are HIV negative. The guidelines are based on the infant feeding recommendations and informed choice policy of WHO, UNICEF, UNAIDS, and UNFPA (WHO, 2003). This document identifies the specific behaviors required of a mother or caregiver to act upon these recommendations.

## HIV, Infant Feeding, and Informed Choice

Infants can acquire HIV infection from their mothers during pregnancy, labor and delivery, or through breastfeeding. If no interventions are in place to reduce MTCT, an estimated 5 to 10 percent of HIV transmission will occur during pregnancy, 10 to 15 percent during labor and delivery, and 5 to 20 percent through breastfeeding.[1] No reliable method exists for determining whether an infant is infected until about 6 weeks of age, so the precise timing of transmission cannot be determined. Labor and delivery is the time of greatest risk with as much infection occurring within *hours* as occurs postnatally within *months* of breastfeeding.

The delicate balance between breastfeeding's life-saving benefits and the risk of HIV transmission complicates optimal infant feeding in communities affected by HIV. HIV testing and counseling are important components of strategies to reduce mother-to-child transmission of HIV. Testing provides women and their partners with information on the presence or absence of HIV infection and a context in which to discuss infant feeding options.[2]

Good counseling can help an HIV-positive woman select and practice the safest infant feeding strategy for her individual situation. One-on-one counseling can give counselors valuable insights into women's most realistic feeding options. Ideally women should be counseled during pregnancy and after delivery to ensure that they have adequate time to make infant feeding decisions and support to implement them.

## Care and Support for the Mother

Although these guidelines focus on infant feeding, they are intended for use in integrated maternal and child health programs that include a comprehensive package of services for both the mother and child. In addition to HIV testing and counseling, all mothers should be offered, as appropriate:

- Family planning counseling
- Testing, prevention, and treatment of sexually transmitted and other reproductive tract infections

1. WHO, UNICEF, UNFPA, UNAIDS. HIV transmission through breastfeeding: A review of available evidence. Geneva: World Health Organization, 2004.

2. All women should be encouraged to be tested and counseled to find out their HIV status. HIV testing and counseling can help pregnant women and their families make informed choices about 1) infant feeding options, 2) future pregnancies, 3) HIV prevention practices, and 4) interventions and support services.

- Malaria prophylaxis and treatment
- Nutrition counseling and support
- Counseling on how to protect themselves and their partners from HIV[3]

HIV-positive mothers should also be offered:

- Antiretroviral drugs
- Prevention and treatment of tuberculosis and opportunistic infections
- Psychosocial support
- Assistance with partner notification
- Referral to support services in the community
- Regular monitoring of health status

If clinically indicated (WHO 2003) and available, highly active antiretroviral (ARV) therapy should be used to treat the mother. By slowing the infection and reducing the amount of HIV in breastmilk, such regimens are also likely to reduce HIV transmission through breastfeeding. By keeping mothers alive and healthy, antiretroviral treatment contributes to the health of the infant and delays or prevents children from becoming orphans. WHO recommends that if mothers taking ARV treatments to delay disease progression choose to breastfeed, they should continue their ARV regimen even though the effects on infant health and on transmission through breastfeeding have not yet been evaluated (WHO 2004).

Where appropriate, the HIV-positive woman should receive nutrition counseling and support in addition to antiretroviral drugs. Nutritional care and support may be the only treatment to which she has access. Reduced appetite, poor nutrient absorption, and physiological changes can lead to weight loss and malnutrition in HIV-infected people. Nutritional requirements are known to increase as a result of HIV infection and should be met by increased intakes of nutritious foods. HIV infection increases energy needs by an estimated 10 percent.

Some micronutrient supplements have been shown to improve the survival of HIV-infected adults with more advanced infection. Although adequate micronutrient intake is best achieved through an adequate diet, multiple micronutrient supplements may be needed in pregnancy and lactation in some settings. Due to concerns about the possible negative effects of certain micronutrients in excess of requirements, WHO currently recommends that intake by HIV-infected women not exceed "recommended daily allowance" levels.

Lactation also increases nutritional requirements. To support lactation and maintain maternal reserves, breastfeeding mothers (whether infected or not) should consume the equivalent of about one extra meal (650 Kcal) per day. Normally, mothers are hungrier and thirstier during lactation and will satisfy this need if food and drink are available. HIV-infected mothers with reduced appetites can be encouraged to eat well by ensuring that food is available, appetizing, and nutritious.

For more guidance on nutrition, care, and support for people living with HIV, see FANTA (2001) and FAO / WHO (2002). For food and nutrition implications of antiretroviral therapy, see Castleman et al. (2003).

3. Regardless of the feeding option a woman chooses, she must protect herself from becoming infected with HIV. This means abstaining from sex, having sex with only one partner who has tested negative for HIV and remains faithful, or using condoms at every sexual encounter.

# Options during the First Six Months

Infant feeding options are presented for two groups of women:

- The majority—those whose HIV status is unknown or who have been tested and found to be HIV negative
- Those who have been tested for HIV and found to be positive

For additional information, readers are encouraged to consult the guidelines on HIV and infant feeding developed by WHO, UNICEF, UNAIDS, and UNFPA (2003) and counseling materials produced by WHO, UNICEF, and the Academy for Educational Development.

## Recommended feeding practices for women who are HIV negative or do not know their HIV status

For women who are HIV negative or of unknown HIV status, there is a single infant feeding recommendation—exclusive breastfeeding for the first six months. Those who do not know their HIV status should know that exclusive breastfeeding may protect their infant from becoming infected with HIV. *Mixed feeding* (feeding the infant both breastmilk and other foods or liquids) is thought to irritate the infant's gut and allow easier access of the virus, although this is not known for sure. Mothers should also know that correct attachment at the breast helps prevent cracked nipples and mastitis, which can increase the risk of infection in the infant.

Exclusive breastfeeding for the first six months and the prevention and treatment of breast conditions (cracked or bleeding nipples, mastitis, breast abscess, or *Candida*) should be recommended practices for all mothers who are HIV negative or who do not know their status. These "safer breastfeeding" practices are optimal for the health of the HIV-negative mother and her infant and may reduce the risk of transmission among infected mothers who do not know their status. Widespread promotion of these practices as a cultural norm may prevent them from becoming stigmatizing behaviors associated with HIV infection.

### Exclusive breastfeeding from birth to 6 months

**Mother gives infant only breastmilk for the first 6 months.**

- Breastmilk is the best food for an infant. Breastmilk provides all the nutrients in the correct amounts that an infant needs to satisfy hunger and thirst.
- Infants who are fed only breastmilk through the first 6 months of life are likely to have fewer diarrheal, respiratory, and ear infections.
- Exclusive breastfeeding helps space births by delaying the return of fertility.

**Mother initiates breastfeeding within 1 hour of birth.**

- After birth, newborn should be placed on mother's chest and abdomen for skin-to-skin contact. As soon as newborn shows signs of readiness to feed, such as mouth movements, mother can help baby attach to her breast.
- Early initiation:
  - Takes advantage of the newborn's intense suckling reflex and alertness
  - Stimulates breastmilk production
  - Protects infant from disease by providing the thick yellowish first milk (colostrum), which is the infant's first vaccine
  - Helps expel the placenta more rapidly and reduce blood loss
  - Helps expel meconium, the infant's first stool
  - Keeps newborn warm through skin-to-skin contact
  - Fosters bonding between mother and infant

**Mother helps baby become well attached at the breast.**

- Good attachment is important to enable the infant to suckle effectively, remove milk efficiently, and stimulate an adequate supply. Poor attachment results in incomplete removal of milk and can lead to sore nipples, inflammation of the breast, and mastitis.
- Signs of good attachment:
  - More areola (dark area around nipple) is visible above the baby's mouth than below
  - Baby's mouth is wide open
  - Baby's lower lip is curled outwards
  - Baby's chin touches the breast
  - Baby takes slow, deep sucks, sometimes pausing
  - Suckling is comfortable and pain free
- If any one of the above signs is not correct or if there is pain or soreness, this indicates that the attachment is poor and needs to be corrected.
- To ensure good attachment or to correct poor attachment, the baby needs to be well positioned.
  - Baby's head and body are straight, not bent or twisted
  - Baby faces the breast, starting with the nose opposite the mother's nipple so that the baby reaches up to take the breast (baby should be able to look up at the mother's face, not flat to her chest or abdomen)
  - Baby is close to the mother
  - Baby's whole body is supported, not just the head and shoulders
- To achieve good positioning, mother should be relaxed and comfortable, sitting or lying down, with her back supported.
- To attach the baby, the mother touches the baby's mouth with her nipple, aiming it at the roof of the baby's mouth. When the mouth is open wide, she moves the baby quickly onto it. If there is still soreness or if the baby does not suckle effectively, she tries again.

**Mother breastfeeds frequently, day and night.**

- Mother allows infant to breastfeed on demand as often as the infant wants, day and night. This is usually about 8–12 times in 24 hours, though there may be intervals between feeds that are longer and shorter than 2–3 hours. If the baby is well, mother lets the baby decide how often to feed.
- Breastmilk is perfectly adapted to the infant's small stomach size because it is quickly and easily digested.
- Mother breastfeeds frequently to stimulate milk production and help prevent breast engorgement. Frequent breastfeeding also helps delay the return of menses and thus protect against possible pregnancy.

**Mother offers second breast after infant stops feeding from the first breast.**

- Mother lets infant continue feeding at the first breast until infant releases the breast (mother should not take the baby off the breast). This enables the baby to get the fat, rich "hind milk," which provides much of the energy at the end of the feed, as well as the water and nutrient-rich "fore milk" at the start of the feed. Mother then offers the second breast, which baby may or may not want, and lets the baby decide whether to continue feeding.
- Mother does not give bottles and pacifiers (dummies) to her breastfed infant because they can interfere with breastfeeding and cause diarrhea and other common infections.

**Mother continues breastfeeding when either she or the infant is sick.**

- If *mother* is sick with a cold, flu, or diarrhea, she continues breastfeeding because the germs do not pass through her milk. In fact, breastmilk protects against illness in the infant.

- If *infant* is sick, mother breastfeeds more often (or expresses her milk if the infant cannot breastfeed) so that infant recuperates faster.
- Mother breastfeeds because breastmilk replaces needed water and nutrients lost through frequent loose stools and is the most easily digestible food for the sick infant.

**Mother who will be away from her infant for an extended period expresses her breastmilk. Caregiver feeds expressed breastmilk from a cup.**

- Mother expresses breastmilk following guidelines in Annex 1.
- Mother stores breastmilk in a clean, covered container. Milk can be stored 8 hours at room temperature in a cool place and 72 hours in the refrigerator.
- Mother or caregiver gives infant expressed breastmilk from a cup. Bottles are unsafe to use because they are difficult to wash and can be easily contaminated.

## Feeding options for women who are HIV positive

UN agencies recommend that HIV-infected women avoid breastfeeding when replacement feeding is acceptable, feasible, affordable, sustainable, and safe (AFASS, see Box 1). *Replacement feeding* is the process of feeding a child who is not receiving any breastmilk a diet that provides all the nutrients the child needs. If the AFASS criteria are not met, replacement feeding may present a greater risk to the infant's health than breastfeeding because breastmilk provides protection against infections other than HIV. Moreover, improperly prepared breastmilk substitutes may expose the infant to pathogens. In such cases, the UN agencies recommend exclusive breastfeeding "during the first months of life."[4] Other options include cup feeding of expressed, heat-treated breastmilk and wet nursing.

### Box 1. AFASS Criteria for Replacement Feeding

**Acceptable:** The mother perceives no barrier to choosing replacement feeding for cultural or social reasons, or for fear of stigma and discrimination.

**Feasible:** The mother (or family) has adequate time, knowledge, skills, resources, and support to correctly prepare breastmilk substitutes and feed the infant 8–12 times in 24 hours.

**Affordable:** The mother and family, with available community and/or health system support, can pay for the costs associated with the purchase/production, preparation, storage, and use of replacement feeds without compromising the health and nutrition of the family. Costs include ingredients/commodities, fuel, clean water, and medical expenses that may result from unsafe preparation and feeding practices.

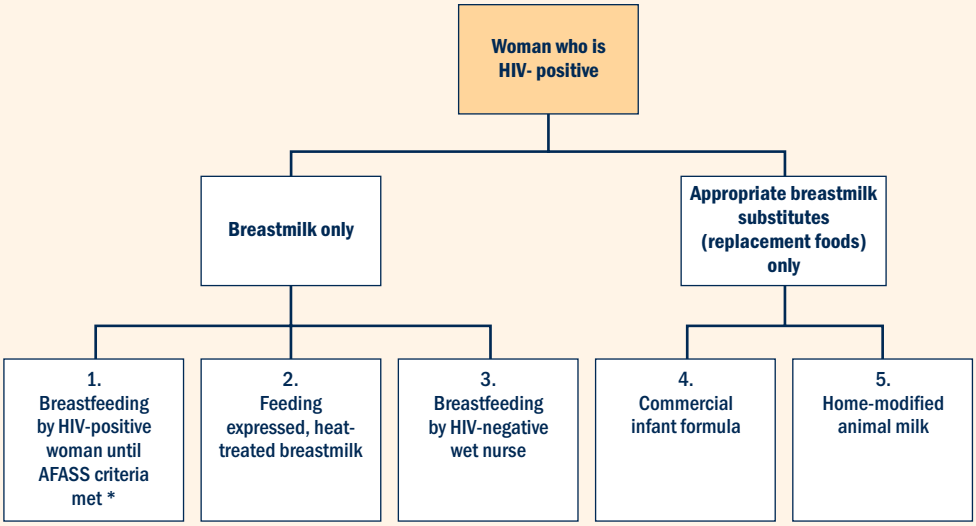
**Sustainable:** A continuous, uninterrupted supply and a dependable system for distribution of all ingredients and products needed to safely practice replacement feeding are available for as long as needed.

**Safe:** Replacement foods are correctly and hygienically stored and prepared and fed with clean hands using clean cups and utensils – not bottles or teats.

*Source:* Adapted from WHO (2003). HIV and infant feeding: A guide for health-care managers and supervisors.

4. WHO. New data on the prevention of mother to child transmission (MTCT) of HIV and their policy implications. Geneva: World Health Organization, 2001.

## Figure 1. Infant feeding options for HIV-positive women during the first 6 months




*If at any time during the six months replacement feeding becomes acceptable, feasible, affordable, sustainable, and safe (AFASS), the HIV-positive woman should transition from exclusive breastfeeding to replacement feeding of breastmilk substitutes.

Circumstances may change and a mother who starts off using one method may switch to another. For example, she may choose to breastfeed exclusively and then transition to one of the other breastmilk options or transition to replacement feeding when the AFASS criteria are met. Shortening the duration of exclusive breastfeeding will reduce the infant's risk of HIV infection (by reducing exposure to HIV in breastmilk).

Mixed feeding should be avoided although this may be difficult during the transition to replacement feeding. At all other times, there should be no mixed feeding; the infant should be fed only breastmilk or only breastmilk substitutes.

Options for HIV-positive women are presented in Figure 1, divided into breastmilk options and appropriate breastmilk substitutes (replacement foods). The numbering of the options is not intended to prioritize them but to aid the reader in linking the text to Figure 1.

## Breastmilk options

Options for the HIV-positive women are presented in Figure 1, divided into breastmilk options[5] and appropriate breastmilk substitutes (replacement foods) only. If the mother decides that replacement feeding is not a good option under current conditions, she should consider the breastmilk options. The counselor should discuss with her ways she can reduce the risk of transmission through safer breastfeeding practices.

5. This document does not present milk banks as a separate option. If these banks are functioning according to recognized standards, they may be a source of breastmilk if donors are screened for HIV or donated milk is heat-treated. Donor milk must always be pasteurized.

## Option 1: Exclusive breastfeeding from birth until AFASS criteria are met or baby reaches 6 months

**HIV-positive mother gives infant only breastmilk from birth if replacement feeding is not acceptable, feasible, affordable, sustainable, and safe.**

- Mother follows the same guidelines as shown above for women who are HIV-negative or do not know their status.
- Breastfed infants who receive other foods or liquids in addition to breastmilk (mixed feeding) may increase their risk of HIV infection. Mixed feeding is thought to irritate the infant's stomach lining and allow easier access of the virus through the infant's gut.

**Mother helps baby become well attached at the breast.**

- Poor attachment results in incomplete removal of milk and can lead to sore nipples, inflammation of the breast, and mastitis. This can increase the risk of transmission of HIV to the infant through the breastmilk. (See guidelines for attachment on page 4.)

**Mother with breast conditions stops breastfeeding from the infected breast and seeks prompt treatment.**

- Mother with cracked nipples, mastitis (inflammation of the breast), abscess, or *Candida* (yeast infection of the nipple and breast) expresses her milk and either discards or heat-treats it before feeding.

**Mother seeks medical care immediately when she is ill.**

- Mother who develops symptoms of full-blown AIDS should consider stopping breastfeeding immediately.

**Mother frequently checks baby's mouth for sores and gets them treated immediately.**

- Sores in the infant's mouth make it easier for HIV to enter the baby's body.

**Mother transitions from exclusive breastfeeding to replacement feeding (commercial formula or modified animal milks only) if it becomes acceptable, feasible, affordable, sustainable, and safe.**

- Mother develops a specific plan that will enable her to minimize risk and discomfort (see Box 2).

### Box 2. Transitioning from Breastfeeding to Replacement Feeding

- Express breastmilk (see Annex 1).
- Accustom the infant to cup feeding by introducing expressed breastmilk by cup. One strategy is to offer expressed breastmilk by cup between regular breastfeeds. This will help the baby get used to cup feeding.
- Eliminate one feeding at the breast at a time once the infant accepts cup feeding and replace with expressed breastmilk given by cup.
- Express breastmilk and discard it if the breasts become engorged during this process. Use cold compresses to reduce the inflammation.
- Feed only the breastmilk substitute when transition is complete.
- Resist the desire to breastfeed at nighttime or when the child wants comforting.
- Provide adequate protection against pregnancy. Women who stop breastfeeding exclusively lose the contraceptive protection it provides.

**Mother eats well to maintain and build body stores of energy, protein, and important nutrients.**

- Nutritional requirements increase as a result of HIV infection. The HIV-positive woman, with the support of her family and community, should increase her intake of nutritious foods.

## Option 2: Expressed, heat-treated breastmilk

Heat-treated breastmilk is nutritionally superior to other milks, but heat treatment reduces the levels of the anti-infective factors in the breastmilk. Although highly motivated mothers may choose this method, they need time, resources, and support to express and heat-treat breastmilk. Breastfeeding mothers with cracked or bleeding nipples, mastitis, breast abscesses, or *Candida* can heat-treat their milk in the short term while receiving treatment for their breast condition.

**Mother expresses her breastmilk, safely heats the breastmilk, and feeds expressed breastmilk to infant from a cup.**

- Mother expresses breastmilk by following the steps shown in Annex 1.
- Mother stores expressed breastmilk in a clean, covered container in a cool place. Milk can be stored up to 8 hours at room temperature in a cool place and 72 hours in the refrigerator.
- Mother brings the expressed breastmilk to a boil and cools it immediately by standing the container in cold water. Once the milk is heat-treated, it should be used within an hour.[6]
- Mother or caregiver gives infant expressed breastmilk from a cup. Bottles are unsafe to use because they are difficult to wash and can be easily contaminated. Mother or caregiver discards any milk left in the cup after feeding the infant.

## Option 3: Wet nursing by an HIV-negative woman

Wet nursing is breastfeeding by a woman who is not the infant's mother. HIV-positive mothers may want to try this option to reduce the risk of transmission from mother to child. There is a small chance that an HIV-positive infant can pass the virus to a wet nurse if the infant has a sore in her / his mouth or the wet nurse has a breast condition.

**Wet nurse who is HIV negative breastfeeds exclusively.**

- Mother and family consider wet nursing only when:
  - Wet nurse is offered HIV testing and counseling, voluntarily takes a test, and tests HIV negative.
  - Wet nurse practices all optimal breastfeeding behaviors applying to HIV-negative women or women of unknown status who practice exclusive breastfeeding.
  - Wet nurse is provided with information about practicing safe sex to ensure that she remains HIV negative while she breastfeeds the infant.
  - Wet nurse can breastfeed infant frequently, including at night, and for as long as needed.
  - Wet nurse has access to breastfeeding support to prevent and treat cracked / bleeding nipples, mastitis, abscess, or *Candida*.

## Appropriate breastmilk substitutes (replacement foods) options

Suitable breastmilk substitutes include commercial infant formula and animal milk that has been modified by adding water, sugar, and a multivitamin supplement formulated specially for infants. Commercial formula is the most

6. Various methods of home pasteurization have been or are currently under study for their effectiveness in killing HIV while protecting the nutritional qualities of breastmilk and extending the period that expressed breastmilk can be kept sterile without refrigeration.

complete breastmilk substitute and contains adequate micronutrients. However, the proteins and fats in commercial formula are inferior to those in breastmilk. Commercial formula is less easily digested than breastmilk and lacks breastmilk's protective immune factors.

Modified animal milk is difficult for infants to digest and does not contain all of the nutrients they need. The proteins and fats in modified animal milk are inferior to those in breastmilk, and modified animal milk lacks the factors in breastmilk that protect the infant's immune system against childhood diseases. Animal milk should only be offered as an option if appropriate multivitamin supplements are available. (See Annex 2 for micronutrient components of an appropriate supplement.)

All home-modified animal milks carry additional risks of infection and malnutrition if not prepared and used correctly. Mothers or caregivers must make sure that infants receive early case management of illness and careful growth monitoring.

To prevent breast engorgement, plugged milk ducts, or mastitis, lactation needs to be suppressed in the early post-partum period in HIV-positive mothers who choose replacement feeding. To suppress lactation, the infant should not suckle at the breast. The breasts should be well supported, but not tightly bound. If they become full, the mother can express a little breastmilk. This will provide some relief and maintain breast health.

## Option 4. Commercial infant formula

**Mother or caregiver feeds the infant commercial infant formula and no breastmilk.**

- Mother or caregiver replacement feeds exclusively (i.e., does not mix replacement feeds with breastfeeding).
- Mother has access to a reliable and affordable supply of adequate quantities of nutritionally appropriate commercial infant formula for at least 6 months.
- Feeding formula safely requires:
  - Clean water to prepare the food and clean the utensils
  - Adequate supplies of fuel to prepare the formula and boil water to wash the utensils
  - Utensils to prepare and feed the formula (pan, cups, measures for water and milk, spoon, tongs to remove utensils from hot water)
  - Good hygiene, proper sanitation, and a clean surface to prepare the formula
  - Ability to follow instructions on the tin for mixing the formula to ensure that it is not too concentrated or too diluted
  - Time to prepare feeds eight times a day, if refrigeration is not available
- Mother or caregiver prepares fresh commercial formula before each feed if refrigeration is not available.
- Mother or caregiver feeds the infant correctly prepared infant formula by cup (see Table 2 for quantity and frequency of feeds by age). The infant will have to learn to drink from a cup. Even tiny infants can be fed from a cup.

## Option 5. Home-modified animal milk

**Mother or caregiver modifies animal milk (fresh animal milk, full cream—pasteurized or powdered—milk, evaporated milk, or ultra high-temperature (UHT) milk) and feeds the infant. Infant receives no breastmilk.**

- Mother or caregiver follows preparation and mixing guidelines for home-modified animal milk (Tables 1 and 2) when:
  - Commercial infant formula is not readily available or is too expensive for the family
  - Supplies of animal milk are reliable and family can afford to buy about half a liter per day for at least 6 months
  - Family has the resources to make the necessary modifications and feed the home-modified animal milk safely

  - Micronutrient supplements specially formulated for infants are readily available
- Mother or caregiver modifies **fresh animal milks** by 1) diluting milk with water that has been boiled vigorously for a few seconds, 2) bringing the mixture to a boil and removing it immediately from the heat, and 3) adding sugar and a micronutrient supplement. Bringing the fresh animal milk to a boil makes the protein easier to digest. Diluting the milk reduces the concentration of protein and salts, which reduces stress on the infant's immature kidneys. Adding sugar increases the energy concentration to an appropriate level.
- Mother or caregiver modifies **full-cream powdered milk or evaporated milk** by adding cooled, boiled water to make the equivalent of fresh cow's milk formula and then adding sugar.
- Mother or caregiver modifies **ultra-high temperature (UHT) milk** by adding boiled water and sugar to make the equivalent of fresh cow's milk formula.
- Mother or caregiver avoids over-concentration or over-dilution.
- If refrigeration is not available, mother or caregiver prepares home-modified animal milk before each feed, consumes any milk left in the cup after the feed, gives it to an older child, mixes it into foods, or discards. She does not use the milk for a later feed.
- Mother or caregiver helps infant learn to drink from a cup.

**A mother or caregiver should never use sweetened condensed milk, skimmed milk, fruit juices, sugar water, or diluted porridges for replacement feeding. These foods do not provide enough energy and micronutrients.**

## Table 1. Preparation guide for mother / caregiver

### Commercial infant formula

- Wash hands with soap and water.
- Clean all utensils, containers, and cups with soap and water.
- Read or have someone read instructions on the formula tin.
- Boil water vigorously for a few seconds and let it cool. Boil as much water as needed for the whole day and store in a clean covered container.
- Measure the amount of milk powder needed for one feed and mix it with the correct amount of boiled water.
- Prepare fresh commercial formula before each feed if refrigeration is not available.
- Feed the infant by cup about 150 milliliters (ml) of correctly prepared formula per kg per day, divided into 6–8 feeds. The infant will have to learn to drink from a cup.

### Home-modified animal milk

- Wash hands with soap and water.
- Clean all utensils, containers, and cups with soap and water.
- Boil water vigorously for a few seconds and let it cool. Boil as much water as needed for the whole day and store in a clean, covered container.
- Measure the amount of water and milk needed (see Table 2).
- Measure the exact amount of sugar and mix it with the liquid (see Table 2).
- Prepare formula before each feed if refrigeration is not available.
- Feed the infant by cup the appropriate amount based on the infant's weight. The infant will have to learn to drink from a cup.
- Give the infant multivitamins specially formulated for the non-breastfed child. The multivitamin can be in the form of liquid syrup (5 ml per day) or powder. The multivitamin can be mixed with the formula or given separately.

## Table 2. Recommended amounts of ingredients for replacement feeds, first 6 months

| Age (months) | Number of Feedings and Daily Milk Requirements | Cow (fresh or UHT), goat, or camel (per feeding) | Sheep and buffalo milk (per feeding) | Evaporated milk (per feeding) | Powdered full cream milk (per feeding) | Commercial formula (per month) |
|---|---|---|---|---|---|---|
| 0–<1 | 8 feeds/day x 60 ml/ feed<br>Total: 480 ml/day | 40 ml milk +20 ml water + 4 grams (g) sugar (slightly less than 1 teaspoon) | 30 ml milk +30 ml water + 3 g sugar (slightly less than ½ teaspoon) | 16 ml milk + 44 ml water + 4 g (level teaspoon) sugar | 5 g milk + 60 ml water + 4 g (level teaspoon) sugar | 4 x 500-g tins |
| 1–<2 | 7 feeds/day x 90 ml/ feed<br>Total: 630 ml/day | 60 ml milk +30 ml water + 6 g sugar (1¼ teaspoons) | 45 ml milk + 45 ml water + 5 g sugar (1 teaspoon) | 24 ml milk +66 ml water +6 g (1¼ teaspoons) sugar | 7.5 g milk + 90 ml water + 6 g (1¼ teaspoons) sugar | 6 x 500-g tins |
| 2–<3 | 6 feeds/day x 120 ml/ feed<br>Total: 720 ml/day | 80 ml milk +40 ml water +8 g sugar (slightly more than 1½ teaspoons) | 60 ml milk + 60 ml water + 6 g (1¼ teaspoons) | 32 ml milk +88 ml water + 8 g (2 level teaspoons) | 10 g milk +120 ml water + 8 g (2 level teaspoons) sugar | 7 x 500-g tins |
| 3–<4 | 6 feeds/day x 120 ml/ feed<br>Total: 720ml/day | 80 ml milk +40 ml water + 8 g sugar (slightly more than 1½ teaspoons) | 60 ml milk + 60 ml water + 6 g (1¼ teaspoons) | 32 ml milk +88 ml water +8 g (2 level teaspoons) sugar | 10 g milk +120 ml water + 8 g (2 level teaspoons) sugar | 7 x 500-g tins |
| 4–<5 | 6 feeds/day x 150 ml/ feed<br>Total: 900ml/day | 100 ml milk +50 ml water + 10 g sugar (2 full teaspoons) | 75 ml milk + 75 ml water +8 g sugar (slightly more than 1½ teaspoons) | 40 ml milk +110 ml water + 10 g (2 full teaspoons) sugar | 12.5 g milk +150 ml water + 10 g (2 full teaspoons) sugar | 8 x 500-g tins |
| 5–<6 | 6 feeds/day x 150 ml/ feed<br>Total: 900ml/day | 100 ml milk +50 ml water + 10 g sugar (2 full teaspoons) | 75 ml milk +75 ml water + 8 g sugar (slightly more than 1½ teaspoons) | 40 ml milk +110 ml water + 10 g (2 full teaspoons) sugar | 12.5 g milk +150 ml water + 10 g (2 full teaspoons) sugar | 8 x 500-g tins |

Source: HIV and Infant Feeding Counselling Tools. WHO, UNICEF (forthcoming).

# Options during the Second Six Months

At 6 months an infant reaches an important developmental stage. Breastmilk or breastmilk substitutes are no longer adequate to meet all of the infant's nutritional requirements. Appropriate *complementary foods*—any manufactured or locally prepared food given to an infant as a complement to breastmilk, infant formula, or animal milks—are needed to ensure adequate nutrition. All infants, regardless of the feeding option, should begin receiving complementary foods at 6 months. Guidelines are first presented for HIV-negative women or those who do not know their HIV status followed by options for HIV-positive women. The complementary feeding guidelines need to be tailored to the foods and feeding practices in a country. Annex 3 gives examples of context-specific messages on complementary feeding developed in several of LINKAGES' country programs.

## Recommended feeding practices for women who are HIV negative or do not know their HIV status

Breastmilk meets approximately half of an infant's energy requirements from 6 to 12 months and should remain an important part of the diet of the older infant whose mother is HIV negative or of unknown status. Breastmilk is a major source of energy, fat, protein, and vitamins and continues to reduce the infant's risk of infection.

Both the quantity and quality of complementary foods are important to ensure good health and development. Infants should eat a variety of nutrient-rich foods, including animal products, fruits, and vegetables. Because of limited availability and the cost of animal foods, it is usually not possible for infants to consume sufficient quantities to meet their needs for iron, zinc, or calcium. For that reason a fortified food or micronutrient supplement is recommended.

### Continued breastfeeding and appropriate complementary feeding

**At 6 months, mother or caregiver introduces soft, appropriate foods and continues breastfeeding on demand.**

- When infant is 6 months old, mother gives the infant complementary foods—foods in addition to breastmilk—to help the infant grow strong and healthy. At this age breastmilk cannot meet all the nutritional needs for growth and development.
- Mother continues to give breastmilk as the main food throughout the infant's first year. Breastmilk will continue to protect the child against illness.

**Mother or caregiver increases the amount of food and the number of feedings as the child gets older. Mother or caregiver uses a separate bowl for the child. Mother continues frequent breastfeeding.**

- As child grows, mother or caregiver gives more food. Complementary foods must meet an increasing proportion of the energy requirements. Mother or caregiver begins complementary feeding by adding locally available, feasible, nutrient-rich foods to staple foods.
- Family makes feeding young children a priority to ensure that they get enough food. One way to know children are getting enough food is to put their portions in separate bowls and to help them eat (responsive feeding).
- Mother or caregiver gives small feeds frequently throughout the day because infants have very small stomachs. The

appropriate number of feeds depends on the energy density of the local foods and the usual amounts consumed at each feed. Recommended number of feedings of complementary foods: 2–3 times a day for infants 6–8 months old and 3–4 times a day for infants and young children 9–24 months old, with nutritious snacks offered 1–2 times a day, as desired. Snacks are defined as foods eaten between meals, usually self-fed, convenient, and easy to prepare.

**Mother or caregiver increases food thickness and variety as the child gets older, adapting to the child's nutritional requirements and physical abilities.**

- Mother or caregiver gives child a variety of foods, which he or she is ready to eat as the gastrointestinal tract and immune system mature and other developmental changes occur. During complementary feeding, mother or caregiver gradually accustoms child to family foods.
- At 6 months mother or caregiver gives infant pureed, mashed, and semi-solid foods.
- At 8 months mother or caregiver gives foods that infant can eat alone, such as cut-up fruit and vegetables.
- By 12 months mother or caregiver gives child family foods.

**Mother or caregiver feeds the child foods rich in nutrients.**

- The nutrient needs of the infant are very high because of rapid growth and development. A varied diet that includes protein, fat, vitamins, and minerals helps ensure that these needs are met and protects against illness.
- Mother or caregiver:
  - Feeds vitamin A-rich fruits and vegetables daily
  - Feeds meat, poultry, or fish daily or as often as possible, if feasible and acceptable
  - Uses fortified foods, such as iodized salt, vitamin A-enriched sugar, iron-enriched flour or other staples, when available
  - Gives vitamin-mineral supplements when animal products and / or fortified foods are not available
  - Avoids giving drinks with low nutrient value, such as tea, coffee, and sugary beverages

**Mother or caregiver interacts with child during feeding (responsive feeding).**

- Mother or caregiver interacts with child during feeding to help child ingest food and stimulate child's verbal and intellectual development.
  - Mother or caregiver feeds infant directly and helps older child eat, being sensitive to hunger and satiety cues.
  - Mother or caregiver experiments with food combinations, tastes, textures, and ways to encourage child who refuses many foods.
  - Mother or caregiver minimizes distractions during meals if child loses interest easily.
  - Mother or caregiver remembers that feeding times are periods of learning and love. She talks to child during feeding and has eye-to-eye contact.
- Mother or caregiver is patient, encouraging but not forcing infant to eat.

**Mother or caregiver practices good hygiene and safe food preparation.**

- In resource-limited settings, mother or caregiver feeds liquids from a small cup or bowl. Bottles are difficult to keep clean, and contaminated bottles can cause diarrhea.
- Before feeding child, mother or caregiver washes her / his hands and child's hands with soap and water and uses clean utensils and bowls or dishes to avoid introducing dirt and germs that might cause diarrhea and other infections. Food can be contaminated as a result of poor basic hygiene, poor sanitation, and poor methods of food preparation and storage.
- Mother or caregiver serves food immediately after preparation.

**Mother breastfeeds until child is at least 2 years old.**

- Mother breastfeeds during the second year of life, when breastmilk continues to be an important source of energy, fat, protein, and micronutrients, especially vitamin A. Breastmilk meets approximately one third of the child's energy requirements during the second year of life.
- Mother continues to breastfeed to reduce the risk of infection in a young child.

**Mother continues to breastfeed when child is ill and encourages child to eat during and after illness.**

- Mother continues to breastfeed and feeds the child soft, mashed favorite foods. Breastfeeding is extremely important during illness. Children who are ill often continue to breastfeed even if they refuse other foods.
- After illness, mother or caregiver increases the quantity of food and feeds child more often so child will recover quickly. Mother gives child an additional meal for 2 weeks after recovery. Children are often very hungry during recovery from illness and need more food to support catch-up growth and replace nutrient stores.

## Feeding options for women who are HIV positive

HIV-positive women should follow the same complementary feeding guidelines presented above for women who are HIV negative or of unknown status, making modifications to the behaviors related to breastfeeding. Milk products should remain in the diet throughout the first year because they are good sources of energy and other nutrients. The following options should be presented to HIV-positive women. As before, the order in which they are listed is not an indication of priority.

### Breastmilk options

### Option 1: Breastfeeding until other options are safe and feasible, and appropriate complementary feeding

**Mother reassesses her situation and the risk factors associated with various feeding options.**

- Women who are HIV-negative or of unknown status are encouraged to breastfeed 24 months or beyond. For HIV-positive women, shortening the duration of breastfeeding (early cessation) will shorten the duration of an infant's exposure to HIV.
- The risks of illness and death as a result of artificial feeding decrease as the infant gets older. However, early cessation of breastfeeding may present a greater risk to the infant's health than breastfeeding because the infant will miss breastfeeding's protection against infections other than HIV and possibly be exposed to pathogens in improperly prepared breastmilk substitutes.
- At about 6 months an infant is better able to tolerate undiluted animal milk and a variety of semi-solid foods, so the options for replacement feeding become safer, less difficult, and less expensive than replacement feeding at an earlier age.
- The appropriate time to stop breastfeeding must always be assessed on an individual basis. Under conditions common in resource-limited settings, many experts recommend a transition from exclusive breastfeeding to replacement feeding at about 6 months of age.

**Mother determines that other feeding options are not yet safe and feasible, continues breastfeeding, maintains good breast health, and seeks prompt treatment when needed.**

- Mother seeks treatment immediately when she develops a breast condition, becomes ill, or finds sores in her baby's mouth. During treatment for cracked nipple, mastitis, abscess, or *Candida*, breastmilk should be expressed and either discarded or heat-treated before feeding. The mother who develops symptoms of full-blown AIDS should consider stopping breastfeeding immediately.

**Mother plans transition to other feeding options.**

- Mother learns how to express breastmilk (see Annex 1), minimize discomfort, maintain breast health during the transition, and accustom the infant to cup feeding (see Box 2, page 7).

**Mother avoids reinitiating breastfeeding when the transition is completed.**

- Mixed feeding is difficult to avoid during the transition from breastfeeding to replacement feeding, but it should be strictly avoided once the transition period is completed.
- The transition process can take 2-3 days to 2–3 weeks.

## Option 2: Expressed, heat-treated breastmilk and appropriate complementary feeding

**Mother provides expressed, heat-treated breastmilk by cup.**

- Instructions for breastmilk expression are found in Annex 1; guidelines for heat treatment are found on page 7.

## Option 3: Wet nursing by an HIV-negative woman and appropriate complementary feeding

**HIV-negative wet nurse breastfeeds on demand.**

- Wet nursing should only be considered if the wet nurse is offered HIV counseling and testing, voluntarily takes a test, tests HIV negative, and practices safe sex.
- A small chance exists that an HIV-positive infant could pass the virus to a wet nurse if the infant had a sore in the mouth or the wet nurse had a breast condition such as cracked nipples.

# Breastmilk substitute option

## Option 4: Breastmilk substitutes and appropriate complementary feeding

**Mother or caregiver carefully prepares milk, practices good hygiene, follows safety guidelines, and feeds infant by cup.**

- Appropriate breastmilk substitutes include:
  - *Commercial infant formula*: Follow directions on the tin
  - *Fresh animal milk*: Bring to a boil to kill any bacteria; no dilution is needed
  - *Powdered full-cream milk or evaporated milk*: Add boiled water to make the equivalent amount of fresh cow's milk as instructed on the package or tin
  - *Processed/pasteurized or ultra-high temperature (UHT) milk*: No preparation needed
- Sweetened condensed milk and skimmed milk are *not* appropriate breastmilk substitutes. They do not provide enough micronutrients and energy.

- Mother provides infant who is fed fresh or processed animal milk with a micronutrient supplement, an iron supplement, or iron-fortified foods.

**Mother feeds sick infant animal milk, extra fluids, and complementary foods during and after illness.**

- Sick children often reject food or consume small quantities. They should be encouraged to eat their favorite foods and increase fluid intake to prevent dehydration and weight loss.

## Non-milk option

### Option 5: Animal foods and/or specially formulated, fortified foods

**Mother or caregiver feeds infant animal foods (meat, poultry, fish, eggs, or milk products) and/or specially formulated, fortified foods.**

- For infants 6–12 months old, milk provides many essential nutrients and satisfies most liquid requirements. However, in some places, neither animal milk nor infant formula is available.
- Although not ideal, where suitable breastmilk substitutes are not available, the non-breastfed child should be fed animal foods and additional meals containing a variety of other foods.
- Calcium-rich foods such as papaya, orange juice, guava, green leafy vegetables, and pumpkin should be consumed daily.
- Infants not fed milk should be offered plain, clean, boiled water several times a day to satisfy thirst.
- Where neither breastmilk substitutes nor animal foods are available, nutrient requirements cannot be met unless specially formulated, fortified foods or nutrient supplements are added to the diet. Although efforts are underway to develop such products, at present their availability is limited. For this reason, this option is rarely one to consider.

# References and Resources

Brown K, K Dewey, L Allen. 1998. *Complementary feeding of young children in developing countries: A review of current scientific knowledge*. Geneva: World Health Organization.

Castleman T, E Seumo-Fosso, B Cogill. 2003. *Food and nutrition implications of antiretroviral therapy in resource limited settings*. Published for the United States Agency for International Development by the FANTA Project. Washington, DC: Academy for Educational Development.

Coutsoudis A, K Pillay, L Kuhn, et al. 2001. Method of feeding and transmission of HIV-1 from mothers to children 15 months of age: Prospective cohort study from Durban, South Africa. *AIDS* 15:379-87.

Coutsoudis A, K Pillay, E Spooner, et al. 1999. Influence of infant-feeding pattern on early mother-to-child transmission of HIV-1 in Durban, South Africa: A prospective cohort study. *Lancet* 354:471-76.

FANTA. 2001. *HIV/AIDS: A guide for nutrition, care and support*. Published for the United States Agency for International Development by the FANTA Project. Washington, DC: Academy for Educational Development.

FAO / WHO. 2002. *Living well with HIV/AIDS: A manual on nutritional care and support for people living with HIV/AIDS*. Rome: Food and Agricultural Organization.

LINKAGES.1999. *Recommended feeding and dietary practices to improve infant and maternal nutrition*. Published for the United States Agency for International Development by the LINKAGES Project. Washington, D.C.: Academy for Educational Development.

LINKAGES. 2004. B*reastfeeding and HIV/AIDS: Frequently Asked Questions.* Published for the United States Agency for International Development by the LINKAGES Project. Washington, D.C.: Academy for Educational Development.

LINKAGES. 2004. *Integrated prevention of mother-to-child transmission of HIV and support for infant feeding: Health providers course.* Washington, D.C.: Academy for Educational Development.

Nduati R, J Ross. 2001. MTCT of HIV through breastfeeding: Strategies for prevention. Chapter 19 in PR Lamptey and HD Gayle HD, eds. *HIV/AIDS prevention and care in resource-constrained settings*. Arlington, VA: Family Health International.

Pan American Health Organization (PAHO), World Health Organization (WHO). 2003. *Guiding principles for complementary feeding of the breastfed child*. Washington, DC: PAHO.

Ross J, M Labbok. Modeling the effects of different infant feeding strategies on young child survival and mother-to-child transmission of HIV. *American Journal of Public Health.* (in press)

Smith MM, L Kuhn. 2000. Exclusive breast-feeding: Does it have the potential to reduce breast-feeding transmission of HIV-1? *Nutrition Review* 58(11):333-340.

WHO. 2001. *New data on the prevention of mother to child transmission (MTCT) of HIV and their policy implications*. WHO Technical Consultation on Behalf of the UNFPA / UNICEF / WHO / UNAIDS InterAgency Task Team on MTCT. October 11-13, Geneva.

WHO. 2003. *Scaling up antiretroviral therapy in resource-limited settings - 2003 Revision (DRAFT VERSION)*. Geneva: World Health Organization.

WHO. 2004. *Antiretroviral drugs and the prevention of mother-to-child transmission of HIV infection in resource-constrained settings. Recommendations for use, 2004 Revision (DRAFT: 7 January 2004)*. Geneva: World Health Organization.

WHO, UNICEF. 1993. *Breastfeeding counselling: A training course.* Geneva: World Health Organization / CDR / 93.3–6.

WHO, UNICEF. 2003. *Global strategy for infant and young child feeding.* Geneva: World Health Organization.

WHO, UNICEF. *HIV and infant feeding counseling tools.* Developed by the Academy for Educational Development for WHO (forthcoming).

WHO, UNICEF, UNAIDS, UNFPA. 2003. *HIV and infant feeding: Guidelines for decision-makers.* Geneva: World Health Organization.

WHO, UNICEF, UNAIDS, UNFPA. 2003. *HIV and infant feeding: A guide for health-care managers and supervisors*. Geneva: World Health Organization.

WHO, UNAIDS, UNICEF. 2000. *HIV and infant feeding counselling: A training course*. Geneva: World Health Organization.

WHO, UNICEF, UNFPA, UNAIDS. 2004. *HIV transmission through breastfeeding: A review of available evidence*. Geneva: World Health Organization.

WHO, UNICEF, UNFPA, UNAIDS, World Bank, UNHCR, WFP, FAO, IAEA. 2003. *HIV and infant feeding: Framework for priority action.* Geneva: World Health Organization.

## Annex 1

# Guidelines for Expression of Breastmilk

Women expressing breastmilk manually have found the following technique effective.

1. Wash hands
2. Prepare a clean container
3. Gently massage breasts in a circular motion
4. Position thumb on the upper edge of the areola and the first two fingers on the underside of the breast behind the areola
5. Push straight into the chest wall
6. Avoid spreading the fingers apart
7. For large breasts, first lift and then push into the chest wall
8. Roll thumb and fingers forward as if making thumb and fingerprints
9. Repeat rhythmically: position, push, roll; position, push, roll
10. Rotate the thumb and finger positions to remove milk from other parts of the breast

Mothers should avoid squeezing the breast or pulling out the nipple and breast. They should express each breast until the flow of milk slows down.

## Annex 2

# Micronutrients for Home-Modified Animal Milk

The minerals and vitamins needed in a micronutrient supplement to fortify 100 kcal of home-modified animal milk (100 ml of milk + 10 g sugar + 50 ml water) are listed below.

### Minerals:

| | |
|---|---|
| Manganese | 7.5 µg |
| Iron | 1.5 mg |
| Copper | 100 µg |
| Zinc | 205 µg |
| Iodine | 5.6 µg |

### Vitamins:

| | |
|---|---|
| Vitamin A | 300 IU |
| Vitamin D | 50 IU |
| Vitamin E | 1 IU |
| Vitamin C | 10 mg |
| Vitamin $B_1$ | 50 µg |
| Vitamin $B_2$ | 80 µg |
| Niacin | 300 µg |
| Vitamin $B_6$ | 40 µg |
| Folic acid | 5 µg |
| Pantothenic acid | 400 µg |
| Vitamin $B_{12}$ | 0.2 µg |
| Vitamin K | 5 µg |
| Biotin | 2 µg |

Source: WHO, UNICEF, UNAIDS, and UNFPA. HIV and infant feeding: A guide for health-care managers and supervisors. Geneva: World Health Organization, 2003.

## Annex 3

# Examples of Complementary Feeding Messages from LINKAGES' Country Programs

Country programs identified local diets and good practices deserving support, tested ways to improve traditional diets, and identified target audiences and effective strategies to reach them. Examples of recommended practices follow.

### Bolivia

For infants 6–8 months old, mash the thick part of the soup and add a little oil. Give mashed fruits such as banana, papaya, and apple. Also give potatoes, oatmeal, wheat, rice, carrots, squash, lima beans, and (if possible) beef, chicken, or fish.

### Ghana

Prepare and offer a variety of foods that are easy for the child to swallow. Make sure these foods are well cooked, mashed, or ground. Before adding pepper to the family porridge, take out the portion for the young child. To this portion, add foods such as fish powder, groundnut paste (peanut butter), and red palm oil to make it more nutritious. In addition to stews and soups with vegetables, every day give the child some fruits in season. Mangoes, pawpaw (papaya), and oranges are all very good. Wash or peel to ensure the food is clean. Mash or squeeze the fruits so they can be easily swallowed**.** Coax your child to eat. Never force feed. Help your child eat. It may seem to take more time, but it will ensure that the child continues to grow big and strong. A well-fed and healthy infant is a joy for everyone. Sing songs, use games, or tell stories to make feeding enjoyable. Encourage everyone who feeds the child to do the same.

### India

Introduce soft mashed foods such as rice cooked with milk and sugar at mid day and *roti* (bread) mashed and dissolved in milk in the evening.

### Madagascar

Enrich the child's food with a spoonful of oil, groundnut paste (peanut butter), or dried shrimp.

### Nepal

Use local foods such as green leafy vegetables, mangoes, bananas, and papaya. Give fish, meat, and egg if available. Add oil, ghee, or butter to a small amount of food to increase its energy.

### Zambia

Start with light porridge with a bit of oil and sugar added. Add "multimixes" (pounded groundnut, mashed beans, or pounded *kapenta* (small fish) one a time. Increase the consistency of this mix and the frequency of feeding as the child grows. Also give the child locally available green vegetables and fruits in season.

**LINKAGES Project**
**Academy for Educational Development**
**1825 Connecticut Avenue, NW**
**Washington, DC 20009**
**website: www.linkagesproject.org**